FALL 1997

UNIVERSITY OF CALIFORNIA
Institute of Transportation Studies
Technology Transfer Program

Tech Transfer

Technology Transfer for Local Transportation Agencies

Orange County's 91 Express Lanes

The nation's first major congestion pricing project is a success that may be hard to duplicate.

By Linda Howe


A customer using a transponder on the 91 Express Lanes in Orange County

Photo courtesy of California Private Transportation Company, L.P.

"Congestion pricing" means that the amount you pay for a trip on a toll road or bridge will vary depending upon the amount of traffic on the road. The more cars there are, the higher the price for using that road. The fewer cars, the lower the price. It's simple supply and demand economics. In theory, people who don't value traveling at a certain time enough to pay the price will stay home, find another route, or wait a few hours until the price drops. Other people will pay the price and travel, but on a road that's less congested. Thus tolls can be varied to get the most efficient traffic flows for different conditions and the capacity of the roadway is better allocated – to everyone's benefit. This principle is well accepted in the telecommunications and airline industries. Phone calls cost more during regular business hours when most calls are placed. And everybody knows that if you want to fly home for Thanksgiving, you'd better be prepared to pay a higher ticket price or avoid flying on "blackout" days when planes are full and discounts do not apply.

Can congestion pricing actually produce more efficient highway use, as theory suggests? The question has been around for decades, but so far there have been few congestion pricing tests to prove or discredit the concept.

No wonder transportation planners and policy makers are so interested in the lessons being learned from California's first major congestion pricing project, the California Route 91 Variable-Toll Express Lane project in Orange County. Although the project doesn't answer the ultimate question, it is providing some interesting insights about how people make tradeoffs between cost and time for their car trips.

Privately-Operated Express Lanes

The 91 Express Lanes were constructed in the median of a 10-mile stretch of very congested freeway linking the Costa Mesa Freeway in Orange County with Riverside and San Bernardino counties through the Santa Ana Hills. There are four toll lanes (two in each direction) next to the original eight-lane freeway, which is still toll-free. The Express Lanes are operated and maintained by the California Private Transportation Company under a 35-year franchise from the California Department of Transportation (Caltrans). The company, which paid $126 million to construct the lanes, agreed to cap its return on investment at

(Continued on page two)

ALSO IN THIS ISSUE:

ORANGE COUNTY'S 91 EXPRESS LANES

(Continued from cover)

17%; within that parameter it is free to set tolls as it chooses. Drivers currently pay between 50 cents and $2.75, depending on the time of day, and typically save up to 40 minutes on a trip across the hills.

The project opened Dec. 27, 1995, and, according to its general manager Greg Hulsizer, has been a marked success. A quarter of a million vehicles now use the freeway daily; about 10% of them choose to use the Express Lanes and pay the tolls. From a traffic engineering standpoint the extra lanes have helped expand the capacity of the freeway – at no public cost – while helping to absorb continued growth in vehicle miles traveled along the corridor. Although peak hour traffic hasn't changed much on the general purpose lanes – it's still very slow and congested – the duration of the peak hour has decreased slightly. Perhaps most importantly, drivers appear to be quite happy about it all.

Photo courtesy of California Private Transportation Company, L.P.

Free-flowing toll lanes and congested public lanes on California Route 91 in Orange County

The 'value pricing' on SR 91 is unique because drivers have a choice of paying for a 'premium' service or driving for free.

The success raises other questions. Why hasn't "congestion pricing," or "value pricing" as it is now being called, been done before? And can the success be duplicated in other venues?

Automated Toll Collection

Until automated toll collection became workable, it was simply not practical to vary tolls according to the level of congestion. With toll booths, toll takers, and a few "correct change" lanes, there were too many opportunities for errors and miscommunication. Consider the prospect of shifting the toll from, say, 75 cents to $1.50. Alerting drivers that the toll would shift, resetting automatic cash baskets, and getting every toll taker to make the change at the same moment would be a major production. Transponders, roadside sensors, microchips, and a little ingenuity and daring have removed these technical and logistical barriers.

For drivers on the 91 Express Lanes, the automatic toll collection technology has become as familiar as their bank's ATM. Variable message signs at the entrance to the Express Lanes signal the current toll, so drivers can decide whether to use the lane or not on a particular day. If commuters want to use the lanes, however, they must open an account with the Express Lane operators, pre-pay the first $40 and carry a transponder (trademarked FasTrak), which tracks account activity with its microchip. The initial purchase can be done by mail, fax, or in person at a nearby customer service center. Velcro is used to attach the FasTrak to a vehicle's front windshield so the device can be moved from vehicle to vehicle. Then when the driver enters the Express Lanes, the transponder sends a signal to a roadside sensor, which automatically deducts the correct fare from the driver's account. The transponder beeps to signal that all is well. Stopping is not necessary to complete the transaction. The driver's Express Lane account is linked to a credit card so that when the value on the chip dips below $10, another $30 is charged against the credit card.

Enforcing the System

Carpools (defined as three or more people) ride for free in the fast lanes. Thirty-five cameras monitor activity on the lanes. First-

When a driver enters the Express Lanes, the transponder in her car sends a signal to a roadside sensor, which automatically deducts the correct fare from the driver's account.

time violators are fined $15 and invited to buy a transponder; second-time offenders are fined $100 and third-time offenders are ticketed for $300. The operators built the CHP a substation next to the toll lanes and contracted for enforcement.

The technical details all appear to work well, as expected. But technology is not the most interesting aspect of this project. Even more interesting is how the CPTC handled the typical political barriers that have stalled other congestion pricing projects around the country. Chief among these concerns are "taxes" and "equity."

Playing Fair

Typically, when a congestion pricing project is suggested – for example on the San Francisco Bay Bridge – people protest that con-

Linda Howe is director of the Institute of Transportation Studies Technology Transfer Program.

gestion pricing is like a "new tax" on driving. Politicians and policy analysts worry that the new toll is unfair because the burden would fall hardest on the working poor, like a flat tax. Although in theory one could travel at off-peak hours or take an alternate mode, workers will have to pay the peak-hour toll if they have no viable alternatives for dropping off baby and getting to work on time. The working poor are the group with least discretion in working hours, while highly-paid professionals who have some discretion in their work hours would be less hard hit by the extra cost associated with congestion pricing. Dedicating proceeds from the congestion pricing project to transit improvements might be helpful in the long run, but it doesn't solve the immediate problems of individuals at the beginning of a project.

So – until now – the debate was a stand-off between economists and advocacy planners. Both groups assumed the primary benefit would be to the rich; the argument was over whether the benefits of market pricing outweighed the costs for certain groups.

Not Just for the Rich

Experience with the unique version of congestion pricing on the 91 Express Lanes begs the question a bit because it offers drivers a choice between paying for a "premium" service or driving for free. But it also suggests that income may not be as important as previously thought in determining which people will choose a toll lane. Exploring these questions is a significant part of a project evaluation study being conducted for Caltrans by Dr. Ed Sullivan of California Polytechnic State University. (See the related summary on this page.)

According to general manager Hulsizer, the special topography and development economics of the area have made it easy to make this project work. This short stretch of highway links the rapidly expanding job market of Orange County with San Bernardino's housing market, where homes cost 60% less than in Orange County. The 91 freeway is also the only viable commuter route through the hills.

Focus groups and data collected during the sale of the transponders produced interesting, somewhat unexpected information regarding who uses the express lanes, how, and why. For one thing, most purchasers of transponders don't use them every day. Sometimes they choose the slow lanes. As one focus group respondent remarked, if there's no time pressure, you simply turn up the music on the car stereo, relax and drive slowly in traffic. This man uses the Express Lanes for emergencies or when he needs to get to work quickly.

Interestingly, free rides are never allowed – except for carpools – even in the middle of the night when there is no speed differential.

> Free rides are never allowed – except for carpools – even in the middle of the night when there is no speed differential.

Why would anyone choose to pay at night when he or she could ride for free in the uncongested public lanes? The answer lies in another unanticipated benefit of the Express Lanes: security. Some drivers don't mind paying for surveillance cameras and free roadside assistance, particularly at night.

It is significant that the toll is currently within the same price range as a bus ride or a bridge toll. The effects of future population growth and future toll increases are, of course, unknown.

The bottom line is the undeniable success of the project. By June 1997, 18 months after it opened, 92,000 transponders had been sold. Sales of transponders are still very active at 100 per day.

The 91 Express Lanes are providing not only a demonstration of the effectiveness of the technology but also something of a laboratory for observing how drivers make the complex tradeoffs among price, schedule, speed, safety, and time spent in traffic. STOP

A PRELIMINARY EVALUATION OF THE PROJECT'S IMPACTS

Dr. Edward Sullivan, Professor of Civil and Environmental Engineering with California Polytechnic State University, is evaluating the impacts of the 91 Express Lanes in a study funded by the California Department of Transportation and the Federal Highway Administration. Following are a few highlights of his preliminary report, "Impacts of Implementing the California Route 91 Variable-Toll Express Lanes." The report is based on preliminary data gathered through June 1997 and is subject to change. A final evaluation will be published at the end of 1997.

- Travelers' response has been so positive that after the first year, the tolls had to be raised by 25 cents in order to keep the toll lanes free-flowing. This increase cut traffic slightly at first, but then usage bounced back and has been increasing steadily ever since. After the first month, the lanes carried about 8,000 vehicles per day. After 15 months, they were carrying close to 25,000 vehicles per day.
- An attractive and unique feature is that travelers on SR 91 don't need to commit to using the toll lanes until they're on the highway close to where the lanes diverge from the old free lanes. At that point, people know how congested the public lanes are.
- Surveys show that only about one-third of the toll lanes' customers use the lanes every day. Another one-third of customers use the lanes less than once a week.
- Surveys show that income is less important than expected in determining who uses toll lanes. However, people who use the lanes most often have higher incomes on average than those who use the lanes less regularly.
- The tolls on 91 vary according to a pre-announced schedule rather than being tuned minute by minute depending on traffic because customers were not comfortable with "unpredictable" tolls.

How Advanced Traveler Information Can Increase Rural Highway Safety

Les Jorgensen and Robert Sandwick, two of the University of California Field Engineers, wrote these articles based on the Rural Advanced Technology and Transportation Systems International Conference in August 1997.

By Les Jorgensen

Safety is the most significant issue for motorists on rural highways. Rural roads carry 40% of vehicle miles traveled but account for 60% of fatal traffic accidents. There are many explanations: rural roads are often unfamiliar to motorists and may have less than optimal alignments and grades, slow moving vehicles, high truck traffic and animal obstacles.

About 90% of all crashes in rural areas are caused by human error, and injury accidents tend to be more severe. Once an accident does occur, it takes longer to notify officials. Emergency vehicles need longer to respond to the scene, and trauma centers are usually located further away.

Fortunately, new technologies have been developed to improve the safety of rural roads. These include: Advanced Traveler Information Systems (ATIS), which provide real-time updates of road, traffic and weather conditions to travelers en route; Traveler Information Services (TIS), which provide destination-oriented information so that travelers know what to expect when they arrive; and Road and Runway Weather Information Systems (RWIS), a tool to predict when ice will form on the pavement.

These technologies are available and are currently being implemented in pilot programs by a limited but growing number of agencies around the country. Most require significant up-front expenditures to install and program properly.

ATIS Quickly Informs Drivers

ATIS technology improves the driver's ability to operate vehicles safely and responsibly through the use of "Real Time Travel Advisory." Such systems can continuously advise drivers of adverse conditions such as congestion, construction zones, road closures and weather conditions.

One type of new ATIS technology includes information dissemination systems to provide both pre-trip and en route information over wide areas via radio, computer and cell phones. Another type includes site-specific safety advisories and warnings to alert motorists of imminent problems, through the use of enhanced radar detectors, visibility sensors and changeable message signs.

Tourists Benefit From TIS

TIS technology aids tourists visiting rural areas by preparing them for unfamiliar terrain. It provides travelers with information before they hit the road, so they can avoid unexpected delays, select alternate routes, or adjust travel plans and times.

This technology can also inform travelers about services available along their chosen route and at their destination. This can be accomplished through the use of pre-trip information via the Internet, automated telephone hotlines, and en route information systems such as touch-screen kiosks, highway advisory radio stations, and changeable message signs.

RWIS Predicts Icy Conditions

RWIS is a relatively new technology which uses specialized equipment such as video cameras and temperature probes to collect real-time data on air and pavement temperatures and precipitation. This data is combined by computer with information from meteorological services to predict pavement temperatures for a specific area.

These predictions are then transmitted to the highway agency's traffic control center, where field managers can use portable computers to monitor the conditions, advise motorists of icy pavement conditions and dispatch crews to apply deicing chemicals before the pavement freezes.

The Arizona and Montana departments of transportation are currently using ATIS and related technologies in rural areas. The Arizona DOT employs pavement sensors and weather towers to obtain temperature, precipitation and wind speeds, in order to advise motorists of potential hazards and dispatch maintenance crews. Drivers on Interstate 40 can access ATIS with an FM radio, and view variable-message signs along the route.

Montana DOT uses the new technologies to gather and disseminate weather, road and tourist information. A TIS database lists more than 8,000 hotels, restaurants, campgrounds, attractions and special events. This information, as well as up-to-date ski reports and weather and road conditions, can be accessed from kiosks in Montana's tourist information centers, at resorts, and by an 800 number. Current information is also sent by fax to transit and tour operators and trucking dispatch centers.

These traveler information technologies will be enhanced as public and private sectors work together to create intelligent, seamless, interjurisdictional transportation systems. As the new technologies become more available and less costly, more and more agencies are ready to try pilot programs with ATIS, TIS and RWIS.

The Western Transportation Institute at Montana State University-Bozeman is the national center for rural transportation research and education. For information, contact director Stephen Albert by phone at (406) 994-6114; fax at (406) 994-6105; or e-mail at SteveA@coe.montana.edu. STOP

1997 METRIC VERSION OF INSPECTOR'S JOB GUIDE AND HIGHWAY MAINTENANCE TABLES

The 1997 metric version of this guide is now available. Intended to cover the very basic duties of inspection by reference to key activities, this is an update of a similar guide with tables distributed by our office in 1991. The Highway Maintenance Tables in the 1997 metric version are based on the *Metric Guide for Federal Construction*, first edition. To request a copy of either the English (1991) or Metric (1997) version, please call Greg Booma at (510) 231-5677. STOP

How GPS Can Improve Emergency Response in Rural Areas

By Robert Sandwick

While the telephone system now covers much of the United States, there are still vast rural areas that do not have wired telephone lines or cellular service, nor will they in the near future. Travelers in these outlying areas often need emergency telecommunications more than those in populated areas, where someone is likely to see an accident.

Just 30% of accidents that involve vehicles going off the road occur on interstate highways; the rest take place on less well-traveled thoroughfares. In rural areas, 911 response times by helicopter can exceed an hour, which may literally mean the difference between life and death.

Reaching travelers in many rural areas with up-to-date road safety information is also difficult. For example, Variable Message Board signs are currently available to inform travelers of dangerous road conditions. But a person must drive to the sign in order to change the wording, making it difficult or impossible to provide current information at the times when it is most needed.

Satellite Communications

There is hope that modern satellite-based technologies can solve the emergency telecommunications problem in rural areas. Geographic Positioning Systems (GPS) are being offered today as an option in some high-end cars such as Cadillacs, and many new GPS-based services will be available and affordable by the end of this century.

In a GPS, a receiver or transmitter on the ground uses satellites orbiting above the earth to measure the distance to four or five satellites at a time. That data is fed into a computer which is programmed to translate the information into global coordinates (longitude and latitude) or into local road information. In some systems, the user's location is then shown on a map pictured on a dashboard monitor.

GPS have been used for years by sailors and yachtsman, who are accustomed to using longitude and latitude, along with ship's charts, to set a course.

GPS technology got a big boost during the Gulf War, when the Pentagon purchased thousands of units to help locate soldiers in the desert, putting the units into mass production for the first time. And of course the 20-plus satellites used to determine location were all placed there by the U.S. Department of Defense.

A GPS device under the back seat may eliminate the very real fear of lying unconscious after an accident in a remote rural area.

The car-based GPS that are available today are designed primarily to help lost drivers find their way. Drivers use a cell phone to call the company they have selected to receive transmissions from the car's GPS, and the person they reach will know the car's location. In the future, though, GPS will also be very useful for directing 911 emergency vehicles even in remote areas where cell phones don't work.

Life-Saving Device

This will one day be done automatically through the use of GPS 'Mayday' devices in vehicles. A 'black box' containing a GPS transmitter will be installed under the rear seat of the car. It will be programmed to transmit an 'S.O.S.' and the car's location if an accelerometer inside the box registers that the car has been hit with an impact of six Gs (enough to render a typical driver unconscious). With such a system, a helicopter could go straight to the car's coordinates rather than having to drive over the roadway to visually spot the vehicle.

The main limitation to widespread use of GPS in cars is the necessary satellite links. There are two basic types of satellites: geostationary and low earth orbit (LEO). Geostationary satellites orbit 22,200 miles high, in a fixed location over the earth. From this altitude, each satellite covers one-third of the earth; it takes a half-second for a voice message to travel to the satellite and back to earth by radio waves. This delay can be annoying for voice communications. LEOs will orbit about 6,000 miles from the earth, eliminating the voice delay problem.

Five companies should have 189 LEO satellites in orbit and ready for service by the end of this century, paving the way for widespread inexpensive use of GPS technology.

All five companies will establish gateways for incoming calls or data that can be entered into land-based telephones or other communications devices. The first will likely be Motorola's "Iridium," a constellation of 66 LEO satellites with the capability of providing uniform coverage to vast expanses of terrain unserved by traditional telephones or cellular systems.

Prices Coming Down

A car-based GPS now costs around $2,000 (on a 1997 Cadillac) and typically is used in combination with a cell phone. However, the price is expected to drop dramatically by the time the LEO satellites are in position and operating.

In the future, all cars may be equipped with GPS 'Mayday' devices. This gadget, along with a full range of new communications technologies, may eliminate the very real fear of lying unconscious alongside a road in a remote rural location.

Bob Sandwick was recently honored with lifetime membership in two professional organizations, APWA and ASCE. Congratulations Bob!

Rural ITS

A bibliography compiled by
Catherine Cortelyou of the
Harmer E. Davis
Transportation Library, Institute
of Transportation Studies

For information on the availability of these materials, write to Interlibrary Lending, ITS Library, 412 McLaughlin Hall, University of California, Berkeley, CA 94720-1720; telephone us at (510) 642-3604; send a fax to (510) 642-9180 or e-mail us at itslib@uclink4.Berkeley.edu.

Feasibility of ITS Applications in Rural California [Executive Summary]

By Stephen Albert and Patrick McGowen. Report prepared for Caltrans. Bozeman, MT: Western Transportation Institute, 1997, pp. i-ix. (FHWA/CA/OR-96/30)

This study examines potential Advanced Rural Transportation system applications in Northern California and makes recommendations for Caltrans' Program for Advancing Rural Transportation Technologies (PARTT) based on rural stakeholder input at a workshop conducted in Bishop, Calif. Workshop participants were most interested in low-tech applications in the areas of Mayday (improved cellular coverage), travel advisory and traveler information. The study area extends roughly from State Route 36 north to the Oregon border. The report recommends short- and long-term rural ITS deployment strategies, and outlines steps to build a successful Intelligent Transportation system that meets stakeholder needs. A photocopy of the executive summary is available.

"Rural ATIS: A Vision for Deployment"

By Moshen Zarean, et al., *Proceedings of the 1996 Annual Meeting of ITS America*, Washington, D.C.: ITS America, 1996, pp. 46-57.

This summary describes a major national research effort to assess rural traveler needs and develop a strategy for rural deployment with particular attention to FHWA's level of involvement and the role of public/private partnerships. Three focus areas for rural ATIS implementation are defined: Emergency Response, Safety and Hazard Warning and Traveler Information Services. For each area a "road map to deployment" is schematically presented. A brief overview is provided of several technologies that could be used. A list of recommendations for future rural ATIS initiatives is included. The complete report, *Rural Applications of Advanced Traveler Information Systems: Recommended Actions*, (FHWA-RD-97-042) has just been released by FHWA.

"TRANSCAL: A Rural/Urban Traveler Information System"

By Ted Batha. *Proceedings of the 1996 Annual Meeting of ITS America*, Washington, D.C.: ITS America, 1996, pp. 260-270.

This paper describes a 34-month test of a comprehensive inter-regional Traveler Information System extending from San Francisco to the Tahoe/Reno-Sparks area. The system integrated road, traffic, transit, weather and value-added traveler services information, as well as a satellite-based Mayday system. A variety of technologies were used for information dissemination: telephone, personal digital assistants, in-vehicle navigation and display devices, interactive kiosks and traditional broadcast media. The field testing was conducted from 1995 through the early months of 1997 and is being evaluated by the Institute of Transportation Studies at UC-Davis.

"Implementation of a Rural ATIS: Initial Findings from the YATI [Yosemite Area Traveler Information] System"

By John Gard and Paul P. Jovanis. *Proceedings of the 1995 Annual Meeting of ITS America*, Washington, D.C.: ITS America, 1995, pp. 639-645.

The Yosemite region has long suffered from traffic congestion, overcrowding and pollution. To reduce crowding and help travelers to go where there is room for them, an experimental ATIS system is being evaluated. In this program, Yosemite-area travelers are given real-time information on current weather and travel conditions, lodging, transit and camping facilities. Technologies used to provide the information include changeable message signs, highway advisory radio, and a multimedia database accessible through kiosks, computer bulletin boards and touch-tone phones. This paper presents results of a limited test conducted during the 1994 Memorial Day weekend and describes potential benefits of program implementation.

"Exploring the Potential Benefits of a Mayday System: Phase One Results"

By Dean Deeter, Neil Lacey and Linda Smith. *Proceedings of the 1996 Annual Meeting of ITS America*, Washington, D.C.: ITS America, 1996, pp. 41-45.

Improved emergency response to rural vehicle accidents is the goal of the Mayday Operational Test, a federally-sponsored ITS project. The Mayday project has developed the necessary infrastructure to support an emergency notification system throughout the 12,000-square-mile test area of central Colorado. Vehicles can be equipped with a low-cost device which can transmit essential information to an emergency dispatch center, reporting locations accurately and immediately. This paper presents Phase I results of the Colorado Mayday project evaluation and describes the set of potential benefits, as well as work toward the development of national Mayday standards.

"An Assessment of Rural Traveler Needs for ITS Applications"

By R. Sivanandan, et al., *Proceedings of the 1995 Annual Meeting of ITS America*, Washington, D.C.: ITS America, 1995, pp. 659-670.

Prepared by an ITS America task force, this paper synthesizes three studies conducted to assess rural traveler needs: FHWA's Study on Rural Applications of Advanced Traveler Information Systems, Minnesota Guidestar's Rural IVHS Scoping Study, and Colorado's I-70 Rural IVHS Corridor Planning and Feasibility Analysis. STOP

More Harmer E. Davis Transportation Library Resources

PATH Database now on the World Wide Web

Great news for transportation researchers (and *Tech Transfer* readers) with Internet access: the PATH Database is now accessible through the World Wide Web.

The Database, widely known as the world's largest such resource pertaining to Intelligent Transportation Systems, was created in 1989 under the sponsorship of Caltrans and the California PATH (Partners for Advanced Transit and Highways) research program. The Database was set up and is maintained by librarians at the Harmer E. Davis Transportation Library at the University of California, Berkeley.

Worldwide Coverage

Over 10,000 bibliographic records with abstracts are currently found in the PATH Database. The Database covers ITS research both in the United States and internationally, with an emphasis on current research and deployment. Citations come from books, journal articles, conference papers, technical reports, theses, and even selected newspaper articles. Worldwide coverage is assured through international exchange agreements with key ITS organizations in Europe, Asia and Australia.

Detailed search instructions are provided at the Web site.

Recent Additions List

Also available at the site is the *Monthly PATH Recent Additions List*, a collection of 150-200 recent citations to the Database.

Technical Services Librarian Steve Morris was instrumental in mounting the PATH Database on the web. Also working on the project are PATH Database Manager Seyem Petrites and Cataloger Michael Kleiber. The Database is currently mounted on the UC Berkeley Digital Library SunSITE, an innovative digital library applications program managed by The Library, UC Berkeley.

To access the PATH Database, point your Web browser to:
http://sunsite.berkeley.edu/PATH

For the *Recent Additions List*, point your Web browser to:
http://www.lib.berkeley.edu/~path/

For further information on the PATH Database and its Website, contact Seyem Petrites (spetrite@library.berkeley.edu) or Mike Kleiber (mkleiber@library.berkeley.edu).

– *Adapted from* ***Intellimotion*** *newsletter*

Free access to UC's Transportation Library and MELVYL Catalog

If you are on the staff of a local public agency in California, you have direct access to one of the pre-eminent transportation libraries in the nation – if not the world. The ***Harmer E. Davis Transportation Library*** of the Institute of Transportation Studies is located on the UC Berkeley campus and supports transportation research throughout the University of California. Library staff also provide free library assistance to local agencies under an agreement with the California Local Technical Assistance Program (LTAP). There is no charge for research, loans or photocopies provided to the state's local agencies. Visitors are welcome, but it is not necessary to come to Berkeley to use the Library.

The Transportation Library's extensive collection consists of nearly 300,000 items including volumes, microfiche, current serial titles, manuscripts, maps and aeronautical charts. Particular subject strengths include traffic engineering, urban transportation, and Intelligent Transportation Systems. The Library's catalog includes indexed transportation articles in academic and professional journals and proceedings since 1984, making it an especially useful resource.

If you want research help, please call a reference librarian who can search the Library catalog and other databases for you and provide either specific information or a selection of articles and reports related to your interests. If you simply are looking for a particular publication, you can phone or send your request by fax or e-mail.

If you'd like to use the Transportation Library's catalog to do your own research, it is incorporated into the University of California's ***MELVYL Online Catalog***, which is open to the public and accessible by telnet (melvyl.ucop.edu) or www (http://www.melvyl.ucop.edu).

Harmer E. Davis Transportation Library
Institute of Transportation Studies
412 McLaughlin Hall
University of California
Berkeley CA 94720-1720
Ph: (501) 642-3604 Fax: (510) 642-9180
e-mail: itslib@uclink.berkeley.edu
Web: http://www.lib.berkeley.edu/ITSL

Library hours
Academic year:
Monday - Friday 9am to 5pm
Summer and intersessions:
Monday - Friday 1pm to 5pm STOP

CRUISING THE WORLD WIDE WEB FOR TRANSPORTATION RESOURCES

Copies of this very popular tutorial are still available free to public agencies in California.

The package includes a workbook with clear step-by-step instructions and a diskette containing files to be used in conjunction with the workbook. The disk also has bookmarks of transportation-related web sites.

To order your free copy, call Greg Booma, Technology Transfer Program, at (510) 231-5677. STOP

ITS Training Calendar & Events of Interest

For more information or a registration brochure, call the Technology Transfer Program at (510) 231-9590.
To enroll in ITS-sponsored workshops, call University Extension at (510) 642-4111.

SYNCHRO: A Tool for Traffic Signal Timing Analysis and Optimization
San Francisco — Oct. 15

Reengineering Federal-Aid Transportation Projects
San Jose — Oct. 21

Fundamentals of Traffic Engineering
Emeryville — Oct. 20-24

Traffic Signal Equipment and Operations
Anaheim — Oct. 28-29

Superpave Volumetric Mix Design
Richmond — Nov. 3-5

Environmental Analysis for Local Agency Transportation Projects
San Francisco — Nov. 6

The 1994 Highway Capacity Manual Update
Modesto — Nov. 5-7

Introduction to Construction Project Scheduling and Its Impact on Delay Claims
Richmond — Nov. 13-14

Construction Inspection for Traffic Signals and Highway Lighting Systems
San Diego — Nov. 18-20

Asphalt Pavement Fundamentals: Design, Construction, and Rehabilitation
Richmond — Dec. 3-5

Superpave Mix Design and Analysis
Richmond — Feb. 2-6

DISTANCE LEARNING PROGRAMS

Several training packages created by the Institute of Transportation Studies Technology Transfer Program (TTP) can be ordered through the Center for Media and Independent Learning. The cost to public agencies is $55 plus shipping. To order one of the items listed below, please call (CMIL) at (510) 642-8245. For a Distance Learning Brochure, please call TTP at (510) 231-9590.

◆ Reengineering Federal Aid Transportation Projects: A Training Package
◆ Asphalt Pavement Maintenance: A Video Course
◆ Inspector Responsibility and Authority: A Video Course

THE NEW UC SUPERPAVE CENTER AND ITS COURSE OFFERINGS

For the past year, the new Superpave Facility at the University of California-Berkeley (UCB) has been offering training and studying the ruggedness of asphalt pavement test equipment developed by the Strategic Highway Research Program (SHRP).

Superpave (SUperior PERforming Asphalt PAVEments) is a state-of-the-art performance-based system for designing asphalt pavements to meet the demanding roadway needs of the next century. This approach holds the promise of more durable pavements that can withstand extremes of temperature and heavy traffic.

The Superpave Facility was established by the Federal Highway Administration to promote the implementation of Superpave technology. There are five Superpave centers around the country, at Purdue University, Penn State, Auburn University and University of Texas-Austin. The UCB facility is affiliated with the fifth center, at University of Nevada-Reno.

In order to expedite the implementation of research results, the Pacific Coast SHRP Superpave Facility has teamed up with the Technology Transfer Program to offer three courses:

◆ **Superpave Volumetric Mix Design** (3 days): This comprehensive course covers the selection of materials, design, aggregate structure and design asphalt binder content, as well as the evaluation of moisture sensitivity of the asphalt mix. Participants will learn how to use the Superpave gyratory compactor and perform a mix design.

◆ **Superpave Mix Design and Analysis** (5 days): Participants should have some familiarity with the principles of volumetric mix design. This in-depth course focuses on mix performance testing, using the Superpave Shear Tester and Indirect Tensile Tester. Other important performance tests, such as beam fatigue, the thermal stress retrained specimen test, and moisture sensitivity tests will also be discussed. It includes valuable classroom experience and demonstration testing in the laboratory.

◆ **Asphalt Pavement Fundamentals** (3 days): This course is intended for design, materials, construction and maintenance engineers who want to increase their knowledge of current pavement engineering practices and stay up-to-date on emerging technologies, in the critical areas of design, construction and rehabilitation.

For more information, call Larry Santucci at (510) 231-9428.

State and National Events

Streets & Sewers '97
Sponsored by: American Public Works Association & Metropolitan Transportation Commission
Oct. 23-24, San Francisco
Contact: Merrily Burger 510/ 339-8659

CAATS 3rd Annual Meeting
Sponsored by: California Alliance for Advanced Transportation Systems
Oct. 26-28, San Diego
Contact: Kay Hanson 916/ 654-9853

CASE Traffic Safety Conference
Sponsored by: California Association for Safety Education
Oct. 31-Nov. 1, Palm Springs
Contact: Richard Schroer 714/ 832-8986

Conference on Education and Intermodal Transportation
Sponsored by: Transportation Research Board
Nov. 2-5, Washington, DC
Contact: Joedy Cambridge 202/ 334-2934

Workshop on Planning Regional Telecommuting Programs
Sponsored by: Transportation Research Board
Nov. 3-5, Irvine
Contact: Richard Cunard 202/ 334-2934

California Transit Association 32nd Annual Fall Conference
Sponsored by: California Transit Association
Nov. 12-14, Monterey
Contact: Karen Hunting 408/ 899-2558

California State Association of Counties (CSAC) Annual Meeting
Nov. 18-21, Hyatt Regency San Francisco Airport
Contact: Linda Kelly 916/ 327-7500

83rd Annual Meeting of the American Association of State Highway and Transportation Officials and Technology Fair
Sponsored by: AASHTO
Nov. 14-18, Salt Lake City, UT
Contact: Sandra Flegler 202/ 624-5403

6th International Purdue Conference on Concrete Pavement: Design and Materials for High Performance
Sponsored by: Transportation Research Board
Nov. 18-21, West Lafayette, IN
Contact: Frederick Hejl 202/ 334-2934

77th Annual Meeting of the Transportation Research Board
Sponsored by: Transportation Research Board
Jan. 11-15, Washington, DC
Contact: Anita Brown 202/ 334-2362

Local Organizations

Bay Area Section, ITE
Oct. 16, Nov. 20, Jan. 15
Contact: Matthew Ridgway, 510/ 284-3200

Central California APWA Chapter
Nov. 21
Contact: Jim Martin, 209/ 224-1674

Central Coast APWA Chapter
Nov. 12
Contact: Christine Ferrara, 805/ 542-9840

Central California Section, ITE
Sept. 17, Nov. 19, Jan. 21
Contact: Michelle Bitner, 805/ 861-2191

East Bay Traffic Engineers
2nd Thursday of the month
Contact: John Templeton, 510/ 671-3129

Monterey Bay APWA Chapter
Nov. 19, Jan. 21
Contact: Robert Russell, 408/ 758-7429

North Bay Engineers Club
Contact: Paul Wiese, 707/ 421-6072

Northern California APWA Chapter
Oct. 17, Nov. 21, Dec. 19
Contact: Merrily Burger, 510/ 339-8659

Sacramento APWA Chapter
1st Friday of the month
Contact: Timothy Fleming, 916/ 552-2964

San Diego/Imperial APWA Chapter
Nov. 13, Dec. 11, Jan. 8
Contact: Keith Gillfillan, 619/ 451-6100

San Luis Obispo Branch, ASCE
Oct. 16, Nov. 20, Dec. 18
Contact: Diane Dostalek, 805/ 925-0951

South Bay Area APWA Chapter
Nov. 13, Dec. 11, Jan. 8
Contact: Glenn Roberts, 415/ 329-2325

Southern California APWA Chapter
Oct. 30
Contact: Richard Burtt, 310/ 618-2820

If your professional organization meets on a regular basis, let us include it here. Call Linda Ohotsky at (510) 231-9590 or write to Institute of Transportation Studies, Technology Transfer Program, 1355 South 46th Street, Bldg. 452, Richmond Field Station, Richmond, CA 94804-4603.

Art Krieger is retiring after five years as a University of California Field Engineer. He will be missed – but can still be reached at his home in Pasadena. Art's e-mail address is: akrieger@earthlink.net

Traffic Calming on a Low Budget: A Case Study

By Art Krieger

"Traffic calming" is today's buzzword. Any traffic engineering conference, symposium or magazine worth its salt must have programs or articles on the subject. In the July 1997 *ITE Journal,* ITE International President James R. Hanks offered information on "the state of the art of traffic calming."

Although I'm not an expert, in my final article for *Tech Transfer* before I retire, I would like to share the experiences of a smaller agency coping with pressure from citizen groups to "do something about the traffic through our neighborhood."

According to an ITE subcommittee, traffic calming is defined as "the combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behavior and improve conditions for non-motorized street users." The concept can be traced to Europe in the 1970s.

In many instances, traffic calming measures – such as striping a few blocks or changing a few signs – can be accomplished easily and at relatively low cost. Other measures can require extensive physical changes that are quite expensive. Substantial changes in existing roadways, such as converting four lanes to a two-lane road with bicycle lanes, will affect traffic capacity and travel times. In other cases, the benefits of traffic calming are political and provide little in the way of efficient movement of vehicles.

At an engineering meeting, I was approached by a representative from Claremont, CA, a quiet college town with a population of 34,000 located in the foothills of the San Gabriel Mountains, about 50 miles east of Los Angeles. The representative was looking for help with a traffic calming problem. In the course of working with the city, I discovered that Claremont's experience yields some good lessons for other small cities.

> Claremont's experience yields some good lessons for other small cities.

Claremont's engineering division was to look into a neighborhood traffic problem and ascertain which traffic calming measures to consider. The basic issue was slowing down traffic in the Russian Village residential neighborhood where Mills Avenue, with a posted speed of 35 mph, was used by heavy commuter traffic. The hope was that current commuter traffic would use other routes if deterrents to through traffic were installed on Mills Avenue.

Role for an Intern

With limited staff, the Claremont engineering division lacked funding for a study by an outside consultant. Instead, the department hired a part-time intern attending a local engineering college. The college student welcomed the opportunity to conduct studies, prepare reports and recommendations, and keep the project moving. The student derived significant benefits by drawing from the experience of the professional engineering staff, who provided oversight, advice and direction. As field engineer for their area, I sent along whatever information I had on file and referred the staff to the extensive Harmer E. Davis Transportation Library at the University of California, Berkeley.

Information on successful traffic calming solutions in other locations was reviewed. Then, following the gathering of traffic information in the Russian Village area, a number of potential solutions were developed. The intern prepared and submitted a report to Claremont's Traffic and Transportation Commission. The Commission held a public hearing and received extensive public input from Russian Village area residents and others.

To encourage commuters to use other routes, the recommendations included stop signs on Mills Avenue along with a reduction of the posted speed limit to 25 mph. (The stop signs were found to be warranted after the studies were conducted and were approved on that basis; their calming effect is an added bonus.) In addition, the intern and staff proposed the installation of center median signs in both directions on Mills Avenue to announce the entrances to the Russian Village neighborhood, with cobble street surface treatment at each entrance.

Finally, they recommended reducing the traffic lanes on Mills Avenue from two lanes to one lane in each direction. Bike lanes would be striped, with parking spaces wherever possible.

Project Being Implemented

The project as recommended by the intern and staff was eventually approved by the commission and the City Council, and it is now being designed. With funds currently available, the city will hire a contractor to make the improvements. Plans are currently underway in Claremont to initiate a program to help the city set priorities for future traffic calming projects and allocate funding.

Claremont's experience provides several lessons for small cities with limited staff and funding. First, gather information on traffic calming measures used in other places, taking advantage of the experience of others. When appropriate, make use of retired professionals and capable volunteers to handle the time-consuming tasks.

Most importantly, consider using part-time interns to supplement existing personnel, to lessen the impact on the permanent staff's regular assignments. Not all student interns are energetic, take-charge types; be selective. (Incidentally, Claremont's able intern graduated and was quickly snapped up by a well-known transportation consulting firm.)

Field Engineer Art Krieger Retires

By Kathryn Studwell, LTAP Director

When I asked LTAP Field Engineer Art Krieger to share some career highlights for this column, he wondered good-humoredly, "How do you write a human interest story about an engineer?"

Despite this sincere modesty, the fact is that Art has touched many people's lives, both personally and professionally.

Art was a City of Pasadena employee for 28 years, serving the city in many capacities including Director of Public Works and Transportation. He joined the Technology Transfer Program's five-member corps of Field Engineers in 1992. As a field engineer, he visited and advised practically all of the local agencies in 13 California counties at one time or another.

It's a little-known fact that Art almost became a mining engineer. He studied the subject at the University of Nevada-Reno, and during the summers he worked in underground lead and zinc mines in Nevada and California. At his first job with a Utah mining company, Art was asked to survey and install an access road for a small uranium mine. "It's always important to have a good road to bring the equipment in and haul the ore out," said Art, who then set his sights on a career that would entail more road design.

He joined the California Division of Highways (now Caltrans) in the San Bernardino-Riverside area, became a licensed Civil Engineer and took a leave of absence to get his master's degree in Transportation Engineering at ITTE (now ITS) at the University of California, Berkeley.

Then the local agency bug bit him, and he went to work for the City of Pasadena. "I wanted to get involved with projects that are closer to the people who use them." Art said.

Perhaps the project Art is most proud of is the planning and construction of the Route 210 Foothill Freeway through Pasadena. During the 1960s and 1970s, when Art was in charge of the city's engineering staff, he worked closely with Caltrans on many features of the project that had an impact on the city.

At minimal cost to Pasadena, this multi-faceted projected involved the construction of additional on- and off-ramps, wider freeway crossings, continuous parallel frontage roads with street lighting, and sanitary sewer and stormwater interceptors.

"It took a long time," Art said. "I think it's an excellent freeway, despite a bit of congestion during peak commuter periods and new HOV lanes. I'm very proud of the role I played, and the opportunity for the city to benefit from my prior experience with Caltrans."

Art said he is also extremely pleased with the rehabilitation of Pasadena's Colorado Street bridge. The rehab of the 1913 bridge was finally finished five years after Art's retirement from the city.

We at the Technology Transfer Program wish Art the best!

SEARCH FOR ADDITIONAL FIELD ENGINEER BEGINS

Until a new Field Engineer is hired, Bob Sandwick will provide technical assistance to Art's former service area of Los Angeles, Orange and Ventura Counties. The Technology Transfer Program will hire two additional field engineers to provide technical assistance to local transportation agencies. One will serve Northern California; the other will serve the entire state. For a job description, contact me by e-mail at studwell@its.berkeley.edu, or call (510) 231-5674.

INTRODUCING THE TECH TRANSFER EDITORIAL BOARD

We are pleased to announce the creation of an editorial board for the *Tech Transfer* newsletter. These faculty and researchers, all associated with the University of California, will help identify topics and authors for newsletter content and provide anonymous review of submitted articles.

Joy Dahlgren
California PATH

Elizabeth Deakin
Department of City and Regional Planning

Geoffrey Gosling
National Center of Excellence for Aviation Operations Research

John Harvey
Pavement Research Center

J. Karl Hedrick
Director, California PATH

Wolf Homburger
Institute of Transportation Studies

Allan B. Jacobs
Department of City and Regional Planning

Alex Skabardonis
Institute of Transportation Studies

Martin Wachs
Director, University of California Transportation Center

CD-INTERACTIVE TRAINING

CD-Interactive training on four topics is now available through the LTAP Center. The training topics are: Traffic Control in Construction Work Zones, Snow and Ice Control, Management Training, and Safety.

To borrow a CD-I player and training module(s), please call Greg Booma at (510) 231-5677, or call the Caltrans Local Assistance Office in your district, where CD-I equipment is also available.

TECH TRANSFER
University of California
Institute of Transportation Studies
Technology Transfer Program
1995 University Ave.
Berkeley, CA 94720-7019
(510) 231-9590
www.its.berkeley.edu.

Nonprofit Organization
U.S. Postage
PAID
University Extension
University of California

ADDRESS CORRECTION REQUESTED

PLEASE ROUTE TO:

- ☐ CITY/COUNTY ENGINEER
- ☐ PLANNING DIRECTOR
- ☐ PUBLIC WORKS DIRECTOR
- ☐ TRAFFIC ENGINEER
- ☐ TRANSIT MANAGER
- ☐ ____________________________

FALL 1997

Tech Transfer

Technology Transfer for Local Transportation Agencies

Tech Transfer is published quarterly and mailed to over 11,000 readers in California and the United States with funds from the Local Technical Assistance Program (LTAP). California's LTAP center is part of a nationwide network of centers established by the Federal Highway Administration (FHWA) in cooperation with state transportation agencies. The FHWA LTAP is under the State and Local Programs Branch of the Office of Technology Applications. California's LTAP is funded with support from the California Department of Transportation and is administered by the University of California, Institute of Transportation Studies, Technology Transfer Program. If you reprint one of our articles, please send us a copy.

Janet Byron, *Contributing Editor*
Barbara Erickson, *Contributing Editor*
Betsy Wing, *ITS Publications Editor*

ITS Technology Transfer Program (TTP) is a unit of the Institute of Transportation Studies at the University of California, Berkeley. Its mission is to support the development and implementation of advanced transportation systems by facilitating exchanges of information between research and practice and by providing a program of professional training and technical assistance in the areas of traffic operation; infrastructure maintenance; transportation planning and management; airport operations, planning and management; and traffic safety.

Linda Howe, *Technology Transfer Program Director*
Kathryn Studwell, *LTAP Director*

LTAP Field Engineers

The field engineers provide peer-to-peer technical assistance to the local transportation agencies that design, maintain and operate California's surface transportation system. Each field engineer is responsible for one of four service areas covering the state. Call your field engineer when you need advice or help with a technical problem.

Scotty A. Bruce	Harold Callahan	Les Jorgensen	Robert K. Sandwick
5989 Santa Teresa Blvd.	325 Melbourne Dr.	2697 W. Dovewood	3800 N. Bradford St., Space 71
San Jose, CA 95123	Modesto, CA 95356	Fresno, CA 93711	La Verne, CA 91750
(408) 227-7282	(209) 527-6779	(209) 435-2437	(909) 596-5955

Harmer E. Davis Transportation Library
Institute of Transportation Studies

Reference, lending and search services are free to local transportation agencies in California with support from LTAP. Address questions and requests to:

Catherine Cortelyou, Librarian
412 McLaughlin Hall
University of California
Berkeley, CA 94720-1720
Tel: (510) 642-3604; Fax: (510) 642-9180